SEQUENCE LISTING

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Terabe, Masaki
The Government of the United States of America
as represented by The Secretary of the
Department of Health and Human Services

<120> Immunogenic Peptides of XAGE-1

<130> 015280-485100US

<140> US 10/582,703
<141> 2006-06-12

<150> US 60/529,025
<151> 2003-12-12

<150> WO PCT/US04/41639
<151> 2004-12-13

<160> 45

<170> PatentIn Ver. 2.1

<210> 1
<211> 246
<212> DNA
<213> Homo sapiens

<220>
<223> xage-1 p9, 9kD protein expressed from XAGE-1 gene

<220>
<221> CDS
<222> (1)..(246)
<223> xage-1 p9

<400> 1

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atg gag agc ccc aaa aag aag aac cag cag ctg aaa gtc ggg atc cta   48
Met Glu Ser Pro Lys Lys Lys Asn Gln Gln Leu Lys Val Gly Ile Leu
  1               5                  10                  15

cac ctg ggc agc aga cag aag aag atc agg ata cag ctg aga tcc cag   96
His Leu Gly Ser Arg Gln Lys Lys Ile Arg Ile Gln Leu Arg Ser Gln
             20                  25                  30

tgc gcg aca tgg aag gtg atc tgc aag agc tgc atc agt caa aca ccg   144
Cys Ala Thr Trp Lys Val Ile Cys Lys Ser Cys Ile Ser Gln Thr Pro
         35                  40                  45

ggg ata aat ctg gat ttg ggt tcc ggc gtc aag gtg aag ata ata cct   192
Gly Ile Asn Leu Asp Leu Gly Ser Gly Val Lys Val Lys Ile Ile Pro
     50                  55                  60
```

```
aaa gag gaa cac tgt aaa atg cca gaa gca ggt gaa gag caa cca caa   240
Lys Glu Glu His Cys Lys Met Pro Glu Ala Gly Glu Glu Gln Pro Gln
 65                  70                  75                  80

gtt taa                                                         246
Val
```

<210> 2
<211> 81
<212> PRT
<213> Homo sapiens

<220>
<223> xage-1 p9

<400> 2

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Met Glu Ser Pro Lys Lys Lys Asn Gln Gln Leu Lys Val Gly Ile Leu
  1               5                  10                  15

His Leu Gly Ser Arg Gln Lys Lys Ile Arg Ile Gln Leu Arg Ser Gln
             20                  25                  30

Cys Ala Thr Trp Lys Val Ile Cys Lys Ser Cys Ile Ser Gln Thr Pro
         35                  40                  45

Gly Ile Asn Leu Asp Leu Gly Ser Gly Val Lys Val Lys Ile Ile Pro
     50                  55                  60

Lys Glu Glu His Cys Lys Met Pro Glu Ala Gly Glu Glu Gln Pro Gln
 65                  70                  75                  80

Val
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<210> 3
<211> 441
<212> DNA
<213> Homo sapiens

<220>
<223> xage-1 p16, 16.3 kD protein expressed from XAGE-1
gene

<220>
<221> CDS
<222> (1)..(441)
<223> xage-1 p16

<400> 3

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atg ctc ctt tgg tgc cca cct cag tgc gca tgt tca ctg ggc gtc ttc   48
Met Leu Leu Trp Cys Pro Pro Gln Cys Ala Cys Ser Leu Gly Val Phe
  1               5                  10                  15

cca tcg gcc cct tcg cca gtg tgg gga acg cgg cgg agc tgt gag ccg   96
Pro Ser Ala Pro Ser Pro Val Trp Gly Thr Arg Arg Ser Cys Glu Pro
             20                  25                  30

gcg act cgg gtc cct gag gtc tgg att ctt tct ccg cta ctg aga cac   144
Ala Thr Arg Val Pro Glu Val Trp Ile Leu Ser Pro Leu Leu Arg His
         35                  40                  45
```

```
ggc gga cac aca caa aca cag aac cac aca gcc agt ccc agg agc cca   192
Gly Gly His Thr Gln Thr Gln Asn His Thr Ala Ser Pro Arg Ser Pro
     50                  55                  60

gta atg gag agc ccc aaa aag aag aac cag cag ctg aaa gtc ggg atc   240
Val Met Glu Ser Pro Lys Lys Lys Asn Gln Gln Leu Lys Val Gly Ile
 65                  70                  75                  80

cta cac ctg ggc agc aga cag aag aag atc agg ata cag ctg aga tcc   288
Leu His Leu Gly Ser Arg Gln Lys Lys Ile Arg Ile Gln Leu Arg Ser
                 85                  90                  95

cag tgc gcg aca tgg aag gtg atc tgc aag agc tgc atc agt caa aca   336
Gln Cys Ala Thr Trp Lys Val Ile Cys Lys Ser Cys Ile Ser Gln Thr
            100                 105                 110

ccg ggg ata aat ctg gat ttg ggt tcc ggc gtc aag gtg aag ata ata   384
Pro Gly Ile Asn Leu Asp Leu Gly Ser Gly Val Lys Val Lys Ile Ile
        115                 120                 125

cct aaa gag gaa cac tgt aaa atg cca gaa gca ggt gaa gag caa cca   432
Pro Lys Glu Glu His Cys Lys Met Pro Glu Ala Gly Glu Glu Gln Pro
    130                 135                 140

caa gtt taa                                                      441
Gln Val
145
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<210> 4
<211> 146
<212> PRT
<213> Homo sapiens

<220>
<223> xage-1 p16

<400> 4

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Met Leu Leu Trp Cys Pro Pro Gln Cys Ala Cys Ser Leu Gly Val Phe
  1               5                  10                  15

Pro Ser Ala Pro Ser Pro Val Trp Gly Thr Arg Arg Ser Cys Glu Pro
             20                  25                  30

Ala Thr Arg Val Pro Glu Val Trp Ile Leu Ser Pro Leu Leu Arg His
         35                  40                  45

Gly Gly His Thr Gln Thr Gln Asn His Thr Ala Ser Pro Arg Ser Pro
     50                  55                  60

Val Met Glu Ser Pro Lys Lys Lys Asn Gln Gln Leu Lys Val Gly Ile
 65                  70                  75                  80

Leu His Leu Gly Ser Arg Gln Lys Lys Ile Arg Ile Gln Leu Arg Ser
                 85                  90                  95

Gln Cys Ala Thr Trp Lys Val Ile Cys Lys Ser Cys Ile Ser Gln Thr
            100                 105                 110

Pro Gly Ile Asn Leu Asp Leu Gly Ser Gly Val Lys Val Lys Ile Ile
        115                 120                 125
```

Pro Lys Glu Glu His Cys Lys Met Pro Glu Ala Gly Glu Glu Gln Pro
130 135 140

Gln Val
145

<210> 5
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:immunogenic peptide derived from xage-1 14

<220>
<221> MOD_RES
<222> (1)
<223> Xaa = any amino acid (X-1)

<220>
<221> MOD_RES
<222> (2)
<223> Xaa = Leu, Met, Ala, Ile, Val or Thr (X-2)

<220>
<221> MOD_RES
<222> (3)
<223> Xaa = a hydrophobic residue, Met or Ala (X-3)

<220>
<221> MOD_RES
<222> (10)
<223> Xaa = Val, Met, Leu, Ala, Ile or Thr (X-4)

<400> 5
Xaa Xaa Xaa Pro Ser Ala Pro Ser Pro Xaa
1 5 10

<210> 6
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:xage-1 14, immunogenic amino terminal end of xage-1, xage-1 residues 14-23

<400> 6
Gly Val Phe Pro Ser Ala Pro Ser Pro Val
1 5 10

<210> 7
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:1Y xage-1 14, variant of xage-1 14, immunogenic peptide derived from xage-1 14

<400> 7
Tyr Val Phe Pro Ser Ala Pro Ser Pro Val
1 5 10

<210> 8
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:2L xage-1 14, variant of xage-1 14, immunogenic peptide derived from xage-1 14

<400> 8
Gly Leu Phe Pro Ser Ala Pro Ser Pro Val
1 5 10

<210> 9
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:3M xage-1 14, variant of xage-1 14, immunogenic peptide derived from xage-1 14

<400> 9
Gly Val Met Pro Ser Ala Pro Ser Pro Val
1 5 10

<210> 10
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:1Y2L xage-1 14, variant of xage-1 14, immunogenic peptide derived from xage-1 14

<400> 10
Tyr Leu Phe Pro Ser Ala Pro Ser Pro Val
1 5 10

<210> 11
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:2L3M xage-1 14, variant of xage-1 14, immunogenic peptide derived from xage-1 14

<400> 11
Gly Leu Met Pro Ser Ala Pro Ser Pro Val
1 5 10

<210> 12
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:modified xage-1 14 peptide, immunogenic peptide derived from xage-1 14

<400> 12
Gly Val Trp Pro Ser Ala Pro Ser Pro Val
1 5 10

<210> 13
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:modified xage-1 14 peptide, immunogenic peptide derived from xage-1 14

<400> 13
Gly Val Tyr Pro Ser Ala Pro Ser Pro Val
1 5 10

<210> 14
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:modified xage-1 14 peptide, immunogenic peptide derived from xage-1 14

<400> 14
Thr Val Trp Pro Ser Ala Pro Ser Pro Met
1 5 10

<210> 15
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:modified xage-1
14 peptide, immunogenic peptide derived from
xage-1 14

<400> 15
Ser Met Tyr Pro Ser Ala Pro Ser Pro Ile
1 5 10

<210> 16
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:modified xage-1
14 peptide, immunogenic peptide derived from
xage-1 14

<400> 16
Ser Val Phe Pro Ser Ala Pro Ser Pro Thr
1 5 10

<210> 17
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:modified xage-1
14 peptide, immunogenic peptide derived from
xage-1 14

<400> 17
Gly Val Trp Pro Ser Ala Pro Ser Pro Met
1 5 10

<210> 18
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:modified xage-1
14 peptide, immunogenic peptide derived from
xage-1 14

<400> 18
Ser Val Trp Pro Ser Ala Pro Ser Pro Val
1 5 10

<210> 19
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:modified xage-1
14 peptide, immunogenic peptide derived from
xage-1 14

<400> 19
Gly Leu Trp Pro Ser Ala Pro Ser Pro Val
1 5 10

<210> 20
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:modified xage-1
14 peptide, immunogenic peptide derived from
xage-1 14

<400> 20
Ile Val Trp Pro Ser Ala Pro Ser Pro Val
1 5 10

<210> 21
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:modified xage-1
14 peptide, immunogenic peptide derived from
xage-1 14

<400> 21
Gly Leu Ala Pro Ser Ala Pro Ser Pro Val
1 5 10

<210> 22
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:modified xage-1
14 peptide, immunogenic peptide derived from
xage-1 14

<400> 22
Gly Val Ala Pro Ser Ala Pro Ser Pro Val
1 5 10

<210> 23
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:modified xage-1
14 peptide, immunogenic peptide derived from
xage-1 14

<400> 23
Tyr Leu Phe Pro Ser Ala Pro Ser Pro Met
1 5 10

<210> 24
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:modified xage-1
14 peptide, immunogenic peptide derived from
xage-1 14

<400> 24
Tyr Leu Ala Pro Ser Ala Pro Ser Pro Ile
1 5 10

<210> 25
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:modified xage-1
14 peptide, immunogenic peptide derived from
xage-1 14

<400> 25
Tyr Leu Ala Pro Ser Ala Pro Ser Pro Val
1 5 10

<210> 26
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:nucleic acid
sequence encoding SEQ ID NO:6 native sequence

<400> 26
ggcgtcttcc catcggcccc ttcgccagtg 30

<210> 27
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:nucleic acid
sequence encoding SEQ ID NO:9 preferred form

<400> 27
ggcgtcatgc catcggcccc ttcgccagtg 30

<210> 28
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:nucleic acid sequence encoding SEQ ID NO:11 preferred form

<400> 28
ggccttatgc catcggcccc ttcgccagtg 30

<210> 29
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:nucleic acid sequence encoding SEQ ID NO:11 preferred form

<400> 29
ggcctcatgc catcggcccc ttcgccagtg 30

<210> 30
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:nucleic acid sequence encoding SEQ ID NO:11 preferred form

<400> 30
ggcctaatgc catcggcccc ttcgccagtg 30

<210> 31
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:nucleic acid sequence encoding SEQ ID NO:11 preferred form

<400> 31
ggcctgatgc catcggcccc ttcgccagtg 30

<210> 32
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:xage-1 33,
residues 33-42 of xage-1

<400> 32
Ala Thr Arg Val Pro Glu Val Trp Ile Leu
1 5 10

<210> 33
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:xage-1 57,
residues 57-66 of xage-1

<400> 33
His Thr Ala Ser Pro Arg Ser Pro Val Met
1 5 10

<210> 34
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:immunogenic
peptide derived from xage-1 14 where X-1 is Tyr

<220>
<221> MOD_RES
<222> (2)
<223> Xaa = Leu, Met, Ala, Ile, Val or Thr (X-2)

<220>
<221> MOD_RES
<222> (3)
<223> Xaa = a hydrophobic residue, Met or Ala (X-3)

<220>
<221> MOD_RES
<222> (10)
<223> Xaa = Val, Met, Leu, Ala, Ile or Thr (X-4)

<400> 34
Tyr Xaa Xaa Pro Ser Ala Pro Ser Pro Xaa
1 5 10

<210> 35
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:immunogenic
peptide derived from xage-1 14 where X-2 is Leu

<220>
<221> MOD_RES
<222> (1)
<223> Xaa = any amino acid (X-1)

<220>
<221> MOD_RES
<222> (3)
<223> Xaa = a hydrophobic residue, Met or Ala (X-3)

<220>
<221> MOD_RES
<222> (10)
<223> Xaa = Val, Met, Leu, Ala, Ile or Thr (X-4)

<400> 35
Xaa Leu Xaa Pro Ser Ala Pro Ser Pro Xaa
1 5 10

<210> 36
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:immunogenic peptide derived from xage-1 14 where X-3 is Met

<220>
<221> MOD_RES
<222> (1)
<223> Xaa = any amino acid (X-1)

<220>
<221> MOD_RES
<222> (2)
<223> Xaa = Leu, Met, Ala, Ile, Val or Thr (X-2)

<220>
<221> MOD_RES
<222> (10)
<223> Xaa = Val, Met, Leu, Ala, Ile or Thr (X-4)

<400> 36
Xaa Xaa Met Pro Ser Ala Pro Ser Pro Xaa
1 5 10

<210> 37
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:immunogenic peptide derived from xage-1 14 where X-4 is Val

<220>
<221> MOD_RES
<222> (1)
<223> Xaa = any amino acid (X-1)

<220>
<221> MOD_RES
<222> (2)
<223> Xaa = Leu, Met, Ala, Ile, Val or Thr (X-2)

<220>
<221> MOD_RES
<222> (3)
<223> Xaa = a hydrophobic residue, Met or Ala (X-3)

<400> 37
Xaa Xaa Xaa Pro Ser Ala Pro Ser Pro Val
1 5 10

<210> 38
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:9-mer created from SEQ ID NO:5 by omitting Pro at position 9

<220>
<221> MOD_RES
<222> (1)
<223> Xaa = any amino acid (X-1)

<220>
<221> MOD_RES
<222> (2)
<223> Xaa = Leu, Met, Ala, Ile, Val or Thr (X-2)

<220>
<221> MOD_RES
<222> (3)
<223> Xaa = a hydrophobic residue, Met or Ala (X-3)

<220>
<221> MOD_RES
<222> (9)
<223> Xaa = Val, Met, Leu, Ala, Ile or Thr (X-4)

<400> 38
Xaa Xaa Xaa Pro Ser Ala Pro Ser Xaa
1 5

<210> 39
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:9-mer created
from SEQ ID NO:5 by omitting Ser at position 8

<220>
<221> MOD_RES
<222> (1)
<223> Xaa = any amino acid (X-1)

<220>
<221> MOD_RES
<222> (2)
<223> Xaa = Leu, Met, Ala, Ile, Val or Thr (X-2)

<220>
<221> MOD_RES
<222> (3)
<223> Xaa = a hydrophobic residue, Met or Ala (X-3)

<220>
<221> MOD_RES
<222> (9)
<223> Xaa = Val, Met, Leu, Ala, Ile or Thr (X-4)

<400> 39
Xaa Xaa Xaa Pro Ser Ala Pro Pro Xaa
1 5

<210> 40
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:9-mer created
from SEQ ID NO:5 by omitting Pro at position 7

<220>
<221> MOD_RES
<222> (1)
<223> Xaa = any amino acid (X-1)

<220>
<221> MOD_RES
<222> (2)
<223> Xaa = Leu, Met, Ala, Ile, Val or Thr (X-2)

<220>
<221> MOD_RES
<222> (3)
<223> Xaa = a hydrophobic residue, Met or Ala (X-3)

<220>
<221> MOD_RES
<222> (9)
<223> Xaa = Val, Met, Leu, Ala, Ile or Thr (X-4)

<400> 40
Xaa Xaa Xaa Pro Ser Ala Ser Pro Xaa
1 5

<210> 41
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:overall formula
for 9-mers created from SEQ ID NO:5

<220>
<221> MOD_RES
<222> (1)
<223> Xaa = any amino acid (X-1)

<220>
<221> MOD_RES
<222> (2)
<223> Xaa = Leu, Met, Ala, Ile, Val or Thr (X-2)

<220>
<221> MOD_RES
<222> (3)
<223> Xaa = a hydrophobic residue, Met or Ala (X-3)

<220>
<221> MOD_RES
<222> (7)
<223> Xaa = Pro or absent (X-5), when absent, X-6 is Ser

<220>
<221> MOD_RES
<222> (8)
<223> Xaa = Ser or absent (X-6), when absent, X-5 and X-7 are Pro

<220>
<221> MOD_RES
<222> (9)
<223> Xaa = Pro or absent (X-7), when absent, X-5 is Pro and X-6
is Ser

<220>
<221> MOD_RES
<222> (10)
<223> Xaa = Val, Met, Leu, Ala, Ile or Thr (X-4)

<400> 41
Xaa Xaa Xaa Pro Ser Ala Xaa Xaa Xaa Xaa
1 5 10

<210> 42
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:exemplar
nucleic acid encoding a peptide of SEQ ID NO:39

<400> 42
ggcgtcttcc catcggcccc ttcggtg 27

<210> 43
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:exemplar
nucleic acid encoding a peptide of SEQ ID NO:38

<400> 43
ggcgtcttcc catcggcccc tccagtg 27

<210> 44
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:exemplar
nucleic acid encoding a peptide of SEQ ID NO:40

<400> 44
ggcgtcttcc catcggcctc gccagtg 27

<210> 45
<211> 637
<212> DNA
<213> Homo sapiens

<220>
<223> complete nucleic acid sequence of XAGE-1 with
untranslated 5' and 3' ends

<400> 45
gtcgttaatg gggacctggg aaggagcata ggacagggca aggcgggata aggaggggca 60
ccacagccct taaggcacga gggaacctca ctgcgcatgc tcctttggtg cccacctcag 120
tgcgcatgtt cactgggcgt cttcccatcg gccccttcgc cagtgtgggg aacgcggcgg 180
agctgtgagc cggcgactcg ggtccctgag gtctggattc tttctccgct actgagacac 240
ggcggacaca cacaaacaca gaaccacaca gccagtccca ggagcccagt aatggagagc 300
cccaaaaaga agaaccagca gctgaaagtc gggatcctac acctgggcag cagacagaag 360
aagatcagga tacagctgag atcccagtgc gcgacatgga aggtgatctg caagagctgc 420
atcagtcaaa caccggggat aaatctggat ttgggttccg gcgtcaaggt gaagataata 480
cctaaagagg aacactgtaa aatgccagaa gcaggtgaag agcaaccaca agtttaaatg 540
aagacaagct gaaacaacgc aagctggttt tatattagat atttgactta aactatctca 600
ataaagtttt gcagctttca ccaaaaaaaa aaaaaaa 637